

# The Vehicle Routing Problem with Service Level Constraints

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**Abstract.** We consider a vehicle routing problem which seeks to minimize cost subject to service level constraints on several groups of deliveries. This problem captures some essential challenges faced by a logistics provider which operates transportation services for a limited number of partners and should respect contractual obligations on service levels. The problem also generalizes several important classes of vehicle routing problems with profits. To solve it, we propose a compact mathematical formulation, a branch-and-price algorithm, and a hybrid genetic algorithm with population management, which relies on problem-tailored solution representation, crossover and local search operators, as well as an adaptive penalization mechanism establishing a good balance between service levels and costs. Our computational experiments show that the proposed heuristic returns very high-quality solutions for this difficult problem, matches all optimal solutions found for small and medium-scale benchmark instances, and improves upon existing algorithms for two important special cases: the vehicle routing problem with private fleet and common carrier, and the capacitated profitable tour problem. The branch-and-price algorithm also produces new optimal solutions for all three problems.

**Keywords.** Routing, collaborative logistics, service level constraints, integer programming, genetic algorithms.

# The Vehicle Routing Problem With Service Level Constraints

**Michael Brown**



## **The Vehicle Routing Problem With Service Level Constraints:**

Decoding **The Vehicle Routing Problem With Service Level Constraints**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**The Vehicle Routing Problem With Service Level Constraints**," a mesmerizing literary creation penned with a celebrated wordsmith, readers set about an enlightening odyssey, unraveling the intricate significance of language and its enduring affect our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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## **Table of Contents The Vehicle Routing Problem With Service Level Constraints**

1. Understanding the eBook The Vehicle Routing Problem With Service Level Constraints
  - The Rise of Digital Reading The Vehicle Routing Problem With Service Level Constraints
  - Advantages of eBooks Over Traditional Books
2. Identifying The Vehicle Routing Problem With Service Level Constraints
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an The Vehicle Routing Problem With Service Level Constraints
  - User-Friendly Interface
4. Exploring eBook Recommendations from The Vehicle Routing Problem With Service Level Constraints

- Personalized Recommendations
- The Vehicle Routing Problem With Service Level Constraints User Reviews and Ratings
- The Vehicle Routing Problem With Service Level Constraints and Bestseller Lists
- 5. Accessing The Vehicle Routing Problem With Service Level Constraints Free and Paid eBooks
  - The Vehicle Routing Problem With Service Level Constraints Public Domain eBooks
  - The Vehicle Routing Problem With Service Level Constraints eBook Subscription Services
  - The Vehicle Routing Problem With Service Level Constraints Budget-Friendly Options
- 6. Navigating The Vehicle Routing Problem With Service Level Constraints eBook Formats
  - ePub, PDF, MOBI, and More
  - The Vehicle Routing Problem With Service Level Constraints Compatibility with Devices
  - The Vehicle Routing Problem With Service Level Constraints Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of The Vehicle Routing Problem With Service Level Constraints
  - Highlighting and Note-Taking The Vehicle Routing Problem With Service Level Constraints
  - Interactive Elements The Vehicle Routing Problem With Service Level Constraints
- 8. Staying Engaged with The Vehicle Routing Problem With Service Level Constraints
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers The Vehicle Routing Problem With Service Level Constraints
- 9. Balancing eBooks and Physical Books The Vehicle Routing Problem With Service Level Constraints
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection The Vehicle Routing Problem With Service Level Constraints
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine The Vehicle Routing Problem With Service Level Constraints
  - Setting Reading Goals The Vehicle Routing Problem With Service Level Constraints
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of The Vehicle Routing Problem With Service Level Constraints

- Fact-Checking eBook Content of The Vehicle Routing Problem With Service Level Constraints
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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table of contents

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